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International Journal of Mechanical and Production Engineering Research and Development
Volume 8, Issue 3, 30 June 2018, Pages 1147-1158

CFD analysis of cd nozzle and effect of nozzle pressure ratio on pressure and velocity for suddenly expanded flows (Article)

Khan, S.A.^a, Aabid, A.A.^a, Baig, M.A.A.^b

^aDepartment of Mechanical Engineering, Faculty of Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia

^bDepartment of Mechanical Engineering, CMR Technical Campus, Hyderabad, Telangana, India

Abstract

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A numerical work was carried out to study the effectiveness of micro-jets to control base pressure in suddenly expanded two-dimensional planar duct. Two micro-jets of 1 mm orifice diameter located at 90° intervals along a pitch circle distance of 1.5 times the nozzle exit diameter in the base region were employed as active controls. The calibrated Mach numbers at the entry to suddenly expanded duct was 1.87. The length-to-diameter ratio (L/D) of suddenly expanded duct was 10. Nozzles generating the calibrated Mach numbers were operated with nozzle pressure ratio (NPR) 3, 5, 7, 9 and 11. From the present investigation it is evident that for a given Mach number and effect of NPR will result in maximum increase/decrease of pressure and velocity. The convergent-divergent nozzle geometry has been modelled and simulated employing turbulence models: K-ε standard wall function turbulence model from the code was independently checked with the commercial computational fluid dynamics. © TJPRC Pvt. Ltd.

Author keywords

ANSYS C-D nozzle CFD Mach number Pressure

ISSN: 22496890

Source Type: Journal

Original language: English

DOI: 10.24247/ijmperdjun2018119

Document Type: Article

Publisher: Transstellar Journal Publications and Research Consultancy Private Limited (TJPRC)

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- ☐ 1 Ahmed, M., Baig, A.L.I.
Active control of base pressure in suddenly expanded flow for area ratio 4. 84
(2012) *International Journal of Engineering Science and Technology*, 4 (5), pp. 1892-1902. Cited 2 times.

- ☐ 2 Ajoko, T.J., Tuaweri, T.J.
(2017) *Design Optimisation of Convergent-Divergent Aircraft Nozzle*, 8 (1), pp. 9-16.

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(2017) *IOP Conference Series: Materials Science and Engineering*

CFD analysis of effect of flow and geometry parameters on thrust force created by flow from nozzle

Pathan, K.A. , Khan, S.A. , Dabeer, P.S.
(2017) *2017 2nd International Conference for Convergence in Technology, I2CT 2017*

CFD analysis of effect of area ratio on suddenly expanded flows

Pathan, K.A. , Khan, S.A. , Dabeer, P.S.
(2017) *2017 2nd International Conference for Convergence in Technology, I2CT 2017*

☐ 3 (2017) *ANSYS FLUENT 18.0: Theory Guidance. Canonsburg PA*

☐ 4 DURST, F., MELLING, A., WHITELAW, J.H.
LOW REYNOLDS NUMBER FLOW OVER A PLANE SYMMETRIC SUDDEN EXPANSION.

(1974) *Journal of Fluid Mechanics*, 64 (1 (JUNE 3, 1974)), pp. 111-128. Cited 48 times.

[View at Publisher](#)

☐ 5 Moorthy, C.V.K.N.S.N., Srinivas, V., Prasad, V.V.S.H., Vanaja, T.
Computational analysis of a cd nozzle with 'SED' for a rocket air ejector in space applications

(2017) *International Journal of Mechanical and Production Engineering Research and Development*, 7 (1), pp. 53-60. Cited 5 times.

<http://www.tjprc.org/publishpapers/2-67-1485846302-IJMPERDFEB20176.pdf>

☐ 6 Khan, S.A., Rathakrishnan, E.
Active control of suddenly expanded flows from overexpanded nozzles

(2002) *International Journal of Turbo and Jet Engines*, 19 (1-2), pp. 119-126. Cited 21 times.

<http://www.degruyter.com/view/j/tjj.2012.29.issue-2/issue-files/tjj.2012.29.issue-2.xml>

doi: 10.1515/TJJ.2002.19.1-2.119

[View at Publisher](#)

☐ 7 Khan, S.A., Rathakrishnan, E.
Control of Suddenly Expanded Flows with Micro-Jets

(2003) *International Journal of Turbo and Jet Engines*, 20 (1), pp. 63-81. Cited 22 times.

<http://www.degruyter.com/view/j/tjj.2012.29.issue-2/issue-files/tjj.2012.29.issue-2.xml>

doi: 10.1515/TJJ.2003.20.1.63

[View at Publisher](#)

☐ 8 Khan, S.A., Rathakrishnan, E.
Active control of suddenly expanded flows from underexpanded nozzles

(2004) *International Journal of Turbo and Jet Engines*, 21 (4), pp. 233-253. Cited 16 times.

<http://www.degruyter.com/view/j/tjj.2012.29.issue-2/issue-files/tjj.2012.29.issue-2.xml>

doi: 10.1515/TJJ.2004.21.4.233

[View at Publisher](#)

☐ 9 Khan, S.A., Rathakrishnan, E.
Control of suddenly expanded flows from correctly expanded nozzles

(2004) *International Journal of Turbo and Jet Engines*, 21 (4), pp. 255-278. Cited 14 times.

<http://www.degruyter.com/view/j/tjj.2012.29.issue-2/issue-files/tjj.2012.29.issue-2.xml>

doi: 10.1515/TJJ.2004.21.4.255

[View at Publisher](#)

-
- ☐ 10 Khan, S.A., Rathakrishnan, E.
Active control of suddenly expanded flows from underexpanded nozzles - Part II

(2005) *International Journal of Turbo and Jet Engines*, 22 (3), pp. 163-183. Cited 4 times.
<http://www.degruyter.com/view/j/tjj.2012.29.issue-2/issue-files/tjj.2012.29.issue-2.xml>
doi: 10.1515/TJJ.2005.22.3.163

View at Publisher
-
- ☐ 11 Khan, S.A., Rathakrishnan, E.
Control of suddenly expanded flow

(2006) *Aircraft Engineering and Aerospace Technology*, 78 (4), pp. 293-309. Cited 16 times.
doi: 10.1108/17488840610675573

View at Publisher
-
- ☐ 12 Khan, S.A., Rathakrishnan, E.
Nozzle expansion level effect on suddenly expanded flow

(2006) *International Journal of Turbo and Jet Engines*, 23 (4), pp. 233-257. Cited 8 times.
<http://www.degruyter.com/view/j/tjj.2012.29.issue-2/issue-files/tjj.2012.29.issue-2.xml>
doi: 10.1515/TJJ.2006.23.4.233

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-
- ☐ 13 Najar, N.A., Dandotiya, D., Najar, F.A.
Comparative analysis of K-epsilon and Spalart-Allmaras turbulence models for compressible flow through a convergent-divergent nozzle
(2013) *The International Journal of Engineering and Science*, 2 (8), pp. 8-17. Cited 3 times.
-
- ☐ 14 Patel, M.S., Mane, S.D., Raman, M.
Concepts and CFD analysis of De-Laval nozzle

(2016) *International Journal of Mechanical Engineering and Technology*, 7 (5), pp. 221-240. Cited 5 times.
http://www.iaeme.com/MasterAdmin/Journal_uploads/IJMET/VOLUME_7_ISSUE_5/IJMET_07_05_024.pdf
-
- ☐ 15 Rathakrishnan, E., Sreekanth, A.K.
Flow in pipes with sudden enlargement
(1984) *Proceedings of the 14Th International Symposium on Space Technology and Science*, pp. 491-496. Cited 26 times.
-
- ☐ 16 Rehman, S., Khan, S.A.
Control of base pressure with micro-jets: Part I

(2008) *Aircraft Engineering and Aerospace Technology*, 80 (2), pp. 158-164. Cited 7 times.
doi: 10.1108/00022660810859373

View at Publisher
-

□ 17 Zhang, G., Kim, H.D.

Theoretical and numerical analysis on choked multiphase flows of gas and solid particle through a convergent–divergent nozzle

(2018) *Journal of Computational Multiphase Flows*, 10 (1), pp. 19-32.

<http://cmf.sagepub.com/>

doi: 10.1177/1757482X17725474

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